Earth's Hydrosphere
ES-5 The student will demonstrate an understanding of Earth's freshwater and ocean systems.

ES-5.3 Explain how karst topography develops as a result of groundwater processes.
Taxonomy level: 2.7-B Understand Conceptual Knowledge

Previous/future knowledge: Students have not been introduced to the concept in this indicator in any previous grade.

It is essential for students to know that water is a powerful agent of erosion at work underground as well as on Earth's surface.
- Groundwater that passes through *permeable* rock dissolves minerals in the rock.
- Water that moves through organic materials and soil may become acidic, chemically weathering the rock as it passes through.
- Rocks that contain calcite, such as limestone, are susceptible to chemical weathering.

Regions where the chemical weathering effects are visible are said to have *karst topography*.
- These features include sinkholes, caverns, and streams that disappear into cracks in the rock emerging in caves or out cracks long distances away.
- Students should understand how sinkholes and caverns form.
- The formation of cavern characteristics such as *stalactites* and *stalagmites* is also essential.

It is not essential for students to know the chemistry of the processes that take place when rocks undergo chemical weathering. The study of wells, springs, hot springs, and geysers is not part of karst topography.

Assessment Guidelines:
The objective of this indicator is to *explain* how karst topography results from groundwater processes; therefore, the primary focus of assessment should be to construct cause and effect models of groundwater chemical weathering resulting in karst topography formations.
In addition to explain appropriate assessments may require students to:
- *summarize* the formation of stalactites and stalagmites;
- *exemplify* types of karst topography; or
- *identify* karst topography features from descriptions, pictures, or diagrams.